

Atty. Dkt. No. 025572-0102 (fka 082259-0156)

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claims 47, 55, 65, and 69 are currently being amended.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 23-30 and 47-78 are now pending in this application.

Drawings

In section 5 of the Office Action, the Examiner objected to the drawings as failing to comply with 37 CFR § 1.84 p.4 because reference characters 720 and 705 have both been used to designate the same element in Figure 8. Further, the Examiner indicated that numerical references 730 and 710 designate the same part in Figure 8. Applicants respectfully disagree with the Examiner's objection and therefore do not believe that they are required to provide corrected drawings with corrections to satisfy the Examiner's objections.

Applicants respectfully submit that the drawings appear to be clear with regard to reference characters 720 and 705 which are clearly described in the specification. Applicants refer the Examiner to the second paragraph starting on page 10 of the original specification. What is disclosed is a "substrate 705 (e.g., silicon, Gallium Arsenide, etc.) may be overlaid with second material 710 (e.g., doped silicon, doped Gallium Arsenide, other non-doped materials, etc.) forming a plurality of gates patterned in second material 710. Further, the device may include a plurality of laser light sources 720 having a first layer 730 (e.g., semiconductor) overlaid with a second layer 740 (e.g., semiconductor) and having a doped junction 750

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therebetween." Accordingly, the arrow tipped lead line associated with 720 is pointing to a laser light source which comprises three layers 730, 740, and 750, whereas reference numerals 705 is indicating the substrate at the bottom of the device shown in Fig. 8. Applicants refer the Examiner to 37 CFR § 1.84(r)(1) in which it is indicated that arrows may be used at the ends of lines providing their meaning is clear to indicate the entire section towards which points. This is clear by the Applicant's specification in which the arrow tip lead line 720 is pointing to the laser light source as described. Accordingly, Applicants respectfully request the withdrawal of the objection to characters 720 and 705 being used to designate the same elements in Fig. 8. It is clear that the elements to which each reference number is directed. Further, Applicants respectfully submit that the drawing is in compliance with 37 CFR § 1.84(r)(1).

The Examiner also objected to the drawings because reference numerals 730 and 710 were said to designate the same part in Fig. 8. Applicants respectfully request that the Examiner withdraw the objection because it is clear from the specification and the drawing, in the second paragraph starting on page 10 of the original specification, that there is a patterned gate structure 710 patterned in a second material and there is a laser light source 720 having a first layer 730 with a second layer 740 sandwiching a doped layer 750. Accordingly, Applicants do not understand why the Examiner indicates that reference numerals 730 and 710 designate the same part in Fig. 8. The combination of the specification in Fig. 8 make clear that the reference numerals 730 and 710 do not designate the same part. Further, it is made clear by arrow tip lead line 720 that layers 730, 740, and 750 are all a part of the laser light source 720. Accordingly, Applicants respectfully request the withdrawal of the drawing objection.

Claim Rejections – 35 U.S.C. § 112

In section 9 of the Office Action, the Examiner rejected claims 55-64 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The Examiner indicated that "the

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specification and claims fail to teach how could the interference be caused 'along a predetermined axis in the interference region and along other axes in the interference region.'"

Applicants have amended independent claim 55 to recite "an interference region coupled to at least two of the optical conduits that are configured to receive optical input signals, a predetermined axis in the interference region along which maximum interference of the optical signals in the interference region is caused." Accordingly, Applicants amendment to independent claim 55 overcomes the section 112 rejection of claims 55-64.

In section 10 of the Office Action, the Examiner rejected claims 54, 68, 73, and 77 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. The Examiner indicated that "[t]he claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected to make and/or use the invention." The Examiner indicates that "[t]he specification and the claims fail to teach how could 'the interference region is configured to cause substantially no light exiting the interference region output when both light and no light is provided to both first and second coherent light inputs', as recited in amended claim 73. It is not clear how could this be possible that no light exit from the interference region when light either enters or not enters the first and second optical paths. In particular, the claims are drawn to an optical electric circuit wherein interference between the light entering the interference region is an essential requirement for the operation of the optical logic."

Applicants disagree with the Examiner's rejection in that it is well disclosed in the specification that when light to a first and a second input is provided, interference is caused within the interference region of the wavelengths of light and a substantially dark output will appear. Similarly, if no light is provided to both of the inputs, a dark output will also appear. This is well described in Table No. IV on page 8 of the Applicant's specification along with text associated with Table IV. Therefore, Applicants request the withdrawal of the rejection of claim 73.

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The Examiner also rejects claims 54, 68, and 77 because the Examiner states that "The specification does not give positive support for the logic function to be both the NOT and NOT AND gates. To this assertion, Applicants respectfully disagree. Claims 54, 68, and 77 do not recite that the logic functions are both NOT and NOT AND gates. The claims teach that the optical processor is made up of NOT and NOT AND gates. Applicants direct the Examiner's attention to Fig. 4 which depicts a NOT AND gate which is constructed from both a NOT gate and a NAND gate. Accordingly, Applicants respectfully request withdrawal of the section 112 rejections of claims 54, 68, and 77.

Claim Objections

In section 11 of the Office Action, the Examiner objected to claims 47-78 because of informalities. The Examiner indicated that the informalities "the phrase 'interference region . . . is uninterrupted by any other material within the interference region' recited in amended claims 47, 55, 65, and 69 is confusing and indefinite for it is not clear what does this phrase mean? Since on one hand, the interference region is defined by the many boundary materials and on the other hand the interference region is a region to light wave front intercept and interfere and it will never be interrupted or else the interference will never occur." Applicants have amended claims 47, 55, 65, and 69 to recite that the interference region is formed of second material and bounded on its periphery by material other than second material and the interference region is uninterrupted by any other materials within the interference region. What is disclosed in Usagawa et al. is interference regions such as in Figure 1A, e.g., in which the interference region 1 has interruptions in the form of blocks 2 and 2'. Whereas, what Applicants have claimed is an interference region which is bounded on its periphery by other material and that defines the interference region and does not have obstacles such as blocks 2 and 2' which are depicted in Usagawa et al., Fig. 1A. What is depicted in Fig. 1A and other figures in Usagawa et al. is an interference region which is bounded both on its periphery and its interior by blocks 2 and 2'. Thus, Applicants have amended claims 47, 55, 65, and 69 to more clearly define the subject matter which Applicants believe is patentable.

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Claim Rejections – 35 U.S.C. § 103

In section 13 of the Office Action, the Examiner rejected claims 47-58, and 63-78 under 35 U.S.C. § 103(a) as being unpatentable over the patent issued to Usagawa et al. (U.S. Patent No. 5,233,205). The Examiner has indicated that Usagawa et al. teaches either implicitly or inherently all of the claim limitations of independent claims 47, 55, 65, and 69. However, Applicants respectfully disagree. With regard to independent claim 47, Applicants have recited "The interference region comprises the second material and is bounded on its periphery by material other than the second material and the interference region is uninterrupted by any other material within the interference region, the first and second optical inputs are spaced apart and the output is positioned along a chosen line, of many lines, along which maximum destructive interference occurs when the light input at the second input is on." Applicants respectfully submit that the structure recited by Applicants differs from the structure of Usagawa et al. in that the interference region of Applicants' invention does not include boundaries on the interior of the interference region, that is the interference region has only an exterior periphery of another material and does not have an interior periphery of another material as disclosed by Usagawa et al. For example, Figure 1D shows a barrier 2 within the interference region 1 which may be seen as an interior periphery. As recited in independent claim 47, the interference region is uninterrupted by any other material which is a different structure than what is depicted in Usagawa et al. in which a reference input is constantly on.

Applicants respectfully submit that it is disclosed in Figure 1E of Usagawa et al., an uninterrupted interference region, however the uninterrupted interference region 1 is not combined with a constant coherent light input, a light source. Thus, the combination of claim limitations recited in independent claim 47 are not disclosed, taught, or suggested by Usagawa et al. Further, what is taught by Usagawa et al. is that the output may have potentially three different intensities, a low or off value when X1 and X2 are not on, a medium value when either of X1 or X2 is on, and a high value when both X1 and X2 are on. Accordingly, the output 20 is not aligned with a line of maximum destructive interference as recited by Applicants because, if it were, there would be only two output intensities as in Applicants' advantageous design.

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Further, the outputs are not substantially on or substantially off, that is the outputs of Usagawa et al. of Fig. 1E have three different possible values. Accordingly, the sensor 20 must be more complex than the sensors used for Applicants' invention. Thus, Applicants respectfully submit that claim 47 is not obvious under Usagawa et al. because the combination of claim limitations is not taught or suggested by Usagawa et al. and does not provide the same result as Applicants recited invention of claim 47.

Further, the Examiner has indicated some similarities between the quantum wave circuit described by Usagawa et al. and the optical logic circuit recited by Applicants. Applicants however disagree with the Examiner's interpretation. The optical logic circuit is based upon propagation of photons to the material and the destructive interference of wave fronts of photons propagating through the material not through a propagation of electrons and holes through a material. The Examiner also states that the quantum well structures require instant light to excite the electron and hole carriers. However, there are ways in which the electron hole carriers may be induced as opposed to light and the inducement of the electronic hole carriers by light is not described, taught, or suggested by Usagawa et al. Further, although what is described by Usagawa et al. is wave-like behavior of electron waves, light is not propagated through the material causing destructive interference as recited in the claims. Accordingly, the equivalence of an electron wave and a light wave has not been established by Usagawa et al. Thus, for the additional reasons provided above, independent claim 47 and its dependent claims are allowable.

With regard to independent claim 55, independent claim 55 is allowable for substantially the same reasons as independent claim 47.

With regard to independent claim 65, independent claim 65 is allowable for substantially the same reasons as independent claim 47.

With regard to independent claim 69, independent claim 69 is allowable for substantially the same reasons as independent claim 47.

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Applicants respectfully submit that because claims 47, 55, 65, and 69, as amended, are allowable, all of claims 47-78 which include claims depending from the amended independent claims are also allowable.

In section 14 of the Office Action, the Examiner rejected claims 59-62 under 35 U.S.C. § 103(a) as being unpatentable over the patent issued to Usagawa et al. as applied to claim 55 above and further in view of the patent issued to Logan et al. (U.S. Patent No. 3,837,728). Applicants respectfully submit that the claim rejections to claims 59-62 have been addressed because all of the claims 59-62 depend from independent claim 55 which is allowable. Therefore, claims 59-62 are believed to be allowable for at least the same reasons as claim 55.

* * * * *

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

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The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 06-1447. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 06-1447. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 06-1447.

Respectfully submitted,

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